



## The Development of Salt Resources in Pakistan under the Perspective of the China-Pakistan Economic Corridor

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**Abstract:** The salt play an important role in daily life and industry. There are large reserves of high - quality salt deposits in Pakistan. But Pakistani salt resources have a smaller share in international salt trade. The paper analyses the current situation in terms of the development of salt resources in Pakistan through SWOT analysis under the perspective of the China-Pakistan Economic Corridor. On this basis, the paper puts forward some countermeasures and suggestions for developing salt resources in Pakistan, such as increasing salt export, developing the health and wellness tourism with salt as the theme, establishing salt chemical industry chain on the basis of strengthen Sino-Pakistan production capacity cooperation. These measures will help to further alleviate Pakistan's balance of payments.

**Key Words:** Pakistan, Salt Resources, SWOT Analysis, Production Capacity Cooperation, China-Pakistan Economic Corridor

### I. Introduction

As a necessity of human life, salt is an irreplaceable essential element in the process of growth and development of human. It has long been used to preserve food and used as a seasoning. Modern archaeology also proves that many ancient civilization sites have been found near salt fields.<sup>[1]</sup>In some ancient civilizations, salt was once used as a medium of exchange in commodity trade, salt was also used as wages or the wage substitution. In some places, this is still true, as in the gold mines of Fiji Island in the Pacific Ocean, where salt is paid to workers every week.<sup>[2]</sup>The modern English word 'salary' comes from the word 'salt'.

With the development of society, the use of salt has been greatly expanded. Salt has developed from an indispensable seasoning in human diet to an important basic raw material of chemical industry. "Three acids and two bases" is the collective name for the five basic raw materials of the chemical industry, of which hydrochloric acid, caustic soda and soda ash are all produced from salt.

According to statistics, there are more than 14,000 commercial uses for salt, from making pulp and paper to colouring textiles, from making soap and detergents to road thaws and so on. Because of the importance of salt in the field of chemical industry, salt is also known as "the mother of chemical industry".<sup>[3]</sup>It can be said that salt plays a very important role in our daily life.

At present, there are more than one hundred countries and regions producing salt in the world. In recent years, the global salt production is about 270 million tons. The major salt producers are China, the United States, Germany, India, Canada, Australia, Chile, Mexico, Brazil, France, the United Kingdom, the Netherlands and other countries. Among them, China, the United States, Germany, India and Canada account for more than sixty percent of the total salt production in the world.<sup>[4]</sup>

Pakistan has the largest and oldest salt mines in South Asia. Pakistan is also Asia's third-largest salt exporter. Why is Pakistan's salt production not in the top 10 of global salt production? How can the potential of salt development in Pakistan be explored so that it can contribute to the smooth economic development of Pakistan? This paper will discuss and analyze this issue, and make specific recommendations and measures.

### II. SWOT Analysis on the Development of Salt Resources

As one of the earliest regions where salt mine was developed in the world, Pakistan has the potential to become a major salt resources country in the world, because of its abundant rock salt reserves. In order to comprehensively analyze the structural



factors in the development of Pakistani salt resources and to explore the strategies for the development of Pakistani salt resources in the future, this paper chooses SWOT analysis method to analyse the current situation of the development of Pakistani salt resources. The four letters of SWOT stand for Strengths, Weaknesses, Opportunities and Threats. As a whole, SWOT can be divided into two parts: the SW part, which analyzes internal conditions, and the OT part, which is mainly used to analyze external conditions. Through the analysis of the four factors to identify the advantages and disadvantages of Pakistani salt resources, opportunities and challenges, in order to make appropriate decisions and planning.

***Strengths of the development of salt resources***

The first point is that the distribution is concentrated and the reserves are large. Nowadays, Salt mines in Pakistan are concentrated in the Salt Range mountains in Punjab and Khyber Pakhtunkhwa province. The salt mine belt is 160 kilometers. Salt mine sites in the Salt Range area are mainly concentrated in the Khewra Salt Mine, Warcha Salt Mine, Jatta Salt Mine in Punjab province and Bahadur Khel Salt Mine in Khyber Pakhtunkhwa province. According to the available geological survey data, the reserves of the Khewra Salt Mine, Warcha Salt Mine, Jatta Salt Mine and Bahadurkhel Salt Mine each exceed one billion tons(Chart 1).

**the reserves of the part of salt mines in Pakistan**

Salt Mines	Provinces	Total Resources	Purity of salt
Khewra	Punjab	Over one Billion tons	Average 98%
Warcha	Punjab	Over one Billion tons	Average 98%
Jatta	Punjab	Over few Billion tons	98%
Bahadur Khel	Khyber Pakhtunkhwa	Over few Billion tons	98%

Chart 1, the reserves of the part of salt mines in Pakistan(source: Official website of Pakistan Mineral Development Corporation Ltd<sup>[5]</sup> )

The second point is high purity. Rock salt mines in Pakistan are basically purity salt mines. The salt content of Khewra Salt Mines, Warcha Salt Mines, Jatta Salt Mines and Bahadurkhel Salt Mines is 98 percent.Higher sodium chloride content in salt mine will help to reduce development costs and increase profits.

The third point is rich in a large number of trace elements. Our human body is made up of more than fifty elements. We will account for the total weight of the human body less than 1/10000 of the elements known as trace minerals. Although they are very low in human body, they are closely related to human health and survival and play a vital role in human life. Once the lack of these essential trace minerals, the human body will appear disease, even life-threatening. Up to now, there are 18 kinds of essential trace minerals that have been confirmed to be related to human health and life, namely iron, copper, zinc, cobalt, manganese, selenium, iodine, nickel, fluoride, molybdenum, vanadium, tin, strontium, boron, rubidium, arsenic and so on.

Pakistani salt mines were formed hundreds of millions of years ago when the Indian and Eurasian tectonic plates pushed up the undersea crust and evaporated the water. Salt in the sea water mixed with a large number of microorganisms in the earth's crust, and then after a long period of geological inoculation, the formation of today's salt mine rich in a large number of trace minerals. Pakistan's salt mine is rich in dozens of trace minerals, which necessary for human body, including iron, calcium, cobalt, copper, manganese, magnesium, chromium, potassium, phosphorus, iodine, strontium, nickel, aluminum, molybdenum, fluoride, vanadium, rubidium, zinc, gallium, borosilicate, arsenic and selenium, almost including all essential trace minerals for human body, making it the king of salt.

The fourth point is the diversity of products.Pakistani salt mines are mined and processed to produce a wide variety of salt products for food, daily use, decoration and industry.Such as various shapes of salt lamp, vase, candlestick for decorative use; seasoning salt, special flavor salt, table salt for edible use; massage ball, massage stick, deodorant, paperweight, bath salt, bath soap, salt mask, soft water salt, animal lick salt for daily use; snow melt, caustic soda, soda ash, chloride, hydrochloric acid for industrial use.

***The Weaknesses of the development of the salt resources***

The first point is the use of traditional production techniques. Salt mining in Pakistan mainly carried out by the more traditional dry mining method. The dry mining method is originated from the Room and Pillar method introduced by the British mining engineer Dr. Warth in 1872, that is, after the steps of development, preliminary mining and stopping, the ore mined underground is transported to the surface and made into finished salt. At the same time, in the process of processing salt crafts, most of the salt mine enterprises have more traditional production technology, and rarely use advanced technology and processing methods.

The second point is that the annual production is small and mainly concentrated in rock salt mines. Pakistan is one of the few countries in the world which has rock salt, lake salt and sea salt. But Pakistan is a relatively small producer, accounting for less than one percent of global salt production. Total salt production in Pakistan in fiscal year 2019-20 was 3,486,647 tonnes.

Pakistan's rock salt mine, mainly from the Salt Ranges in Punjab province and Khyber Pakhtunkhwa province, produced a total of 3,368,978 tonnes of rock salt in fiscal year 2019-20. Pakistan's lake salt and sea salt, mainly from Punjab province and Sindh province are less productive, with a total production of 117,669 tonnes of lake salt in fiscal year 2019-20 equivalent to only one thirtieth of rock salt production.<sup>[6]</sup>

#### ***Opportunities for Pakistan's salt resources***

First is the global consumption of salt products continues to grow. On the one hand, with the improvement of living standards, global consumers, especially who lives in Europe, America, Asia and other developed regions, prefer to choose high-quality salt products in an increasing number. Various salt crystal lamps made from rock salt mine are believed to be effective in the treatment of allergies, respiratory and blood system diseases. The salt-crystal lamp products from the rock salt mine in Pakistan have the potential to further increase sales in Europe and the United States. On the other hand, the gradual strengthening of industrialization in various countries, countries for a variety of salt chemical raw materials and products made of salt chemical materials in further growth, such as caustic soda, soda ash, hydrochloric acid, polyvinyl chloride, daily-use glass products, etc. Therefore, Pakistani salt manufacturers and sellers can grasp the opportunity to expand production, ensure quality, and actively promote and market, the Americas and Europe and Asia and other regions will be a huge market for Pakistani salt products.

Second is the development opportunities under the framework of China-Pakistan Economic Corridor. As the global economy continues to grow, the consumption of salt in the world, especially in Asia, continues to increase. Asia accounted for 47 percent of global salt consumption in 2016, and that share is expected to rise to 53 percent by 2027.<sup>[7]</sup> China's chemical plants are the main driver of growth. For example, in 2016, China imported 4.95 million tons of raw salt. With the deepening of the construction of China-Pakistan Economic Corridor, the industrialization of Pakistan will be further strengthened, which will promote the growth of domestic demand for salt chemical products in Pakistan. Meanwhile, under the China-Pakistan Free Trade Agreement, Pakistan can actively promote the expansion of salt mining and salt chemical products exports to China. In short, the construction of China-Pakistan Economic Corridor will be a great opportunity to promote the development of Pakistan's salt industry.

#### ***Threats to Pakistan's salt resources***

In 2017, Pakistan's salt exports totaled US\$50.6 million, ranking third among Asian salt exporters, after India and China, but fifteenth among global salt exporters. In terms of global salt export growth rate from 2013 to 2017, Pakistan's growth rate reached 174.4 percent, but it only ranks fifteenth among the countries with the fastest export growth rate.<sup>[8]</sup> Pakistan is now the world's twenty-first largest salt exporter, accounting for 0.88 percent of the world's salt supply.<sup>[9]</sup> Salt production in the world's major salt-producing countries has shown a continuous growth trend in the last decade. If the share of other salt producers continues to increase, Pakistan's share of salt exports will become smaller and smaller. This will be a major challenge for Pakistan's salt industry.

### **III. Measures to Exploit the Development Potential of Pakistan's Salt Industry**

Under the impetus of the construction of China-Pakistan Economic Corridor, the pace of Pakistan's national economic transformation is accelerating, and various industries are ushering in great opportunities. The construction of the China-Pakistan Economic Corridor also offers great opportunities for the further development of the salt industry in Pakistan. Pakistan can take steps to explore the potential for further development of Pakistan's salt industry in the following areas.

#### ***The government should plan the salt export strategy uniformly***

According to the resource endowment of Pakistan, the main export commodities of Pakistan are the traditional products with relatively abundant resource endowment, which are mainly agricultural products and processed products such as cotton veil, garments and textiles. The products are relatively single and few types. Pakistan has few resources and products to participate in the global division of labour and does not have many options. However, Pakistan's imports are mainly mechanical and electrical products and chemical products. Such a trade structure whose export value is less than the import value creates greater pressure on Pakistan's international payment balance. This situation requires Pakistan to actively promote export scale and increase export varieties, according to its own resource endowment, so as to ease the balance of payments deficit.<sup>[10]</sup> Pakistan's salt resource is relatively abundant, so the Pakistani government can develop a strategic plan to further promote salt exports. The specific means are as follows.

The first point is guiding the orderly development of the salt resources, and enhancing the overall efficiency and competitiveness of the salt resources. From the perspective of Pakistan's salt reserves, salt mine and their products are an effective resource that Pakistan can use to increase exports and earn foreign exchange. At present, Pakistan's salt resources mainly uses rock salt mine from the Salt Ranges as raw materials for export, or makes rock salt mine into salt lamps and statues and other handicrafts for export. Relatively speaking, these products are low-tech and low added value, and the

products of various manufacturers are homogenized, which is not conducive to product sales. According to statistics, eighty percent of the manufacturers in this industry outsourced their business to third parties. moreover, of the remaining twenty percent of the manufacturers, 12 percent serve middlemen and only 8 percent are true manufacturers. There are also Chinese and Indian companies that import raw rock salt from Pakistan as a raw material and then process it into finished products and sell them on the international market under their own labels. These phenomena may cause vicious competition in the industry, which is not conducive to improving the overall efficiency and competitiveness of the industry. Therefore, it is suggested that the Pakistani government should impose export duties on raw rock salt, which would reduce the harm to local suppliers and raise revenue for the national treasury. <sup>[11]</sup>The Pakistani government can also support to establish relevant industry associations, and through the industry association to promote the orderly development of the industry, through the association for manufacturers timely and full access to the global trend of the development of salt resources market, coordination between Pakistan's salt resources manufacturers in the production of pricing promotion and sales of decision-making, as maximum as possible to promote the industry bigger and stronger, to improve the overall efficiency and competitiveness of the industry. The second point is increasing sea salt production. Although Pakistan has more than 1,000 kilometers of coastline, sea salt production is just concentrated in the area around Karachi, which is Pakistan's largest city. It should be said that there are conditions and potential for Pakistan to further increase the production of sea salt. The coastal areas of Pakistan have a tropical desert climate, with high temperature and little rain for most of the year, and the heat is unbearable. The Pakistani coast, particularly in Baluchistan province, is largely undeveloped with little industrial pollution. Therefore, appropriate policy measures can be taken by the concerned government departments in Pakistan so that the concerned companies can use the Baluchistan coastline between Hub and Jiwani to produce large quantities of sea salt for export to international markets. <sup>[12]</sup> In short, if the Pakistani government plans to increase exports in exchange for more foreign exchange, encouraging salt exports is one of the possible ways. Appropriate policies by the government to expand the quantity and quality of salt products will help Pakistan's salt resources export and earn more foreign exchange.

#### ***Developing the characteristics of rock salt mine, and develop the recreation and wellness tourism***

Tourism industry is a pillar industry in the world economy, it is playing an increasingly important role in the employment, economy and social development, at the same time, tourism is less investment, quick results, big profits and small pollution industry, also known as the smoke-free industry. Therefore, tourism in more and more countries and regions is attracting attention, and get rapid development.

Pakistan attaches great importance to tourism, which provides more than hundreds of thousands of jobs. It is the only industry that can employ large numbers of people in the remote and mountainous areas of Pakistan, which is rich in natural resources. It is also one of the main sources of foreign exchange for Pakistan. Therefore, tourism plays a very important role in the economic and social development of Pakistan.

However, after nine/eleven terrorist attacks, the war on terror launched by the United States in Afghanistan led to a sharp deterioration in the security situation of the countries involved, including Pakistan. The situation has also had a negative impact on Pakistan's tourism industry. In 2006 Pakistan received just 900,000 foreign visitors and earned US\$260 million in foreign exchange. In recent years, with the gradual improvement of the security situation in Pakistan and the upgrading of tourism facilities, the number of foreign tourists to Pakistan has begun to increase. According to the Pakistan Tourism Development Corporation, the number of foreign tourists reached 1.75 million in 2016, while local tourists increased by 30 percent to 38.3 million.

According to the statistics of the World Tourism and Travel Council (WTTC), the total contribution of Pakistan's tourism industry to the Pakistani economy in 2019 was US\$ fifteen billion, accounting for 5.7 percent of the GDP. <sup>[13]</sup>

Pakistan has a long history of rock salt mining in the Salt Ranges area, it can be traced back to 326 BC Alexander's invasion of the South Asian subcontinent period, and has been mining up to now, becoming one of the earliest salt mine in the world. Therefore, the rock salt mines in Pakistan have the characteristics of experiential, ornamental, regional and immobility, it occupies an important position among tourist destinations in Pakistan.

Around 2003, some of the mined salt caves of Khewra Salt Mines were built into Khewra Salt Mines Museum, and used to develop tourism, so that visitors can experience the unique charm of the salt mine caves with a history of more than one hundred years. It is now one of the four most famous salt museums in the world.

In December 2005, the Pakistan Mineral Development Corporation (PMDC) began to build a twenty-bed asthma clinic in Khewra Salt Mines, which became fully operational in March 2007. The Khewra Asthma Clinic, which mainly treats asthma caused by allergies and other respiratory problems, is the first of its kind in Pakistan. The clinic treats not only Pakistanis but also foreign patients attracted by its reputation. A ten-day course at the salt treatment centre at Khewra Salt Mines costs 5,300 Rupees, spending up to 11 hours a day in a salt mine cave and nights at a nearby hospital. Since its operation in 2007, five hundred patients have been treated by the beginning of 2010. <sup>[14]</sup>

In order to increase the number of tourists, Pakistan Railways began to run a special tourist train from Rawalpindi, Lahore to visit the salt mine in Khewra Salt Mines in February 2011. The above measures offer the possibility to attract more domestic

and foreign tourists to visit Khewra Salt Mines Museum. In recent years, the number of domestic and foreign visitors to Khewra Salt Mines Museum has increased year by year, only to decrease under the influence of the COVID-19 pandemic. With the COVID-19 pandemic gradually under control, the number of domestic and foreign tourists now arriving is gradually recovering (Chart 2).

**Visitors at Khewra Mines Museum in Pakistan during 2015-2021**

Visitors Years	2015	2016	2017	2018	2019	2020	2021
<b>Foreigner</b>	1966	2104	2114	2517	2589	837	1021
<b>National</b>	349935	482439	449313	489285	496780	182400	300891
<b>Total</b>	351901	484543	451427	491802	499369	183237	301912

Chart 2, Visitors at Khewra Mines Museum in Pakistan during 2015-2021 (Source: Official website of Pakistan Bureau of Statistics<sup>[15]</sup>)

Pakistan can vigorously explore the role of salt in healing based on Khewra Asthma Clinic in Khewra Salt Mines, and establish a recreation center nearby based on the salt mines in Kewla to develop physical therapy programs such as Pink Himalayan Salt Baths and Himalayan Salt Spas to provide health and physical therapy services for tourists. In 2016, Pakistan placed the Khewra Salt Mines and Salt Ranges on its provisional list of World Cultural and Natural Heritage sites, pending review by UNESCO.<sup>[16]</sup> Salt Ranges in which the Khewra Salt Mines is located is also known by geologists and paleontologists as an open book on geological history, an ideal place to learn geological knowledge.<sup>[17]</sup> The surrounding area is also rich in historical and cultural sites where visitors can learn and understand the local history and culture.

In short, by effectively integrating recreation with the surrounding history, culture and natural heritage tourism, it will attract more foreign tourists visiting Pakistan as well as Pakistan's own tourists to experience the unique salt history and culture tour around Salt Ranges, which will have a good effect on Pakistan's in-depth development of tourism in Salt Ranges area.

***Undertake the global salt chemical industry transfer, and vigorously develop the salt chemical industry***

Salt chemical industry refers to the use of sodium chloride (solid salt or brine) as the main raw material, through chemical methods to produce sodium carbonate (soda), sodium hydroxide (caustic soda), sodium chlorate and other sodium-containing chemicals and the process of chlorine processing products. Salt chemical industry in addition to provide caustic soda and hydrochloric acid, but also to the downstream extension of the production of polyvinyl chloride (PVC), methane chloride, daily glass products, propylene oxide, soap, diphenyl, methane diisocyanate (MDI), synthetic laundry powder, toluene diisocyanate (TDI), alumina, plate glass, borax, sodium silicate, sodium dichromate, sodium tripolyphosphate and other important basic chemical raw materials and a variety of fine special chemicals. These products of salt chemical industry are also the basic raw materials that drive the development of other industries.

With the further development of global industrialization, salt as the mother of chemical industry, will play a more and more important role in industry, and the demand will be more and more large. The demand for chemical products soared in many countries, many investors in the chemical industry have turned their eyes to develop the salt chemical industry. In view of the current development trend of salt chemical industry in the world, the future development direction of salt chemical industry will continue to be resource-oriented. As a country with a large amount of salt resources, Pakistan has a great advantage. Under the influence of environmental protection, transportation and labour force, the competitiveness of salt chemical industry is gradually increasing. Developed countries are gradually reducing the production of such basic chemical products, and salt chemical industry is shifting to developing countries.<sup>[18]</sup> The salt chemical industry also has the characteristics of long industrial chain and large correlation degree, high added value of technology-intensive products, strong driving ability and outstanding financial and tax contributions. Therefore, considering its own resource endowment, Pakistan should seize the opportunity of industrial transfer in this field, develop the salt chemical industry and extend the salt chemical industry chain along the direction of refinement as far as possible in order to increase the salt products with high added value. This will not only optimize the mix of imports and exports of industrial products to meet domestic demand, but also be used for export to earn foreign exchange and improve Pakistan's balance of payments.

**IV. Strengthen Production Capacity Cooperation Between China and Pakistan in the Salt Chemical Industry**

Pakistan has few goods to export, and salt mine is one of its main exports. But now exports are mainly in the form of raw materials, with low added value. However, the salt products widely use in industry, so it makes the development of the salt chemical industry and increasing the salt chemical industry chain become an important step towards expanding Pakistan's industrial output. China's salt chemical industry is in the stage of resolving excess capacity, so it is necessary to promote the

healthy, effective and sustainable development of salt products and salt chemical industry by promoting the adjustment of internal structure, seeking new development opportunities externally, and effectively integrating internal and external resources and development opportunities. Under the trend of global salt chemical industry transfer to developing countries, and under the construction of China-Pakistan Economic Corridor, Pakistan should seize the new opportunity of further industrialization, strengthen cooperation with relevant Chinese industries and enterprises, undertake industrial transfer and strengthen production capacity cooperation.

At present, China and Pakistan have some cooperation in the field of salt resources. For example, Jointt Group, a Chinese enterprise that entered Pakistan in 2009 to develop business, has carried out production capacity cooperation in the field of salt resources in Pakistan. Jointt Group has set up Pakistan Operation Centre in Lahore, Pakistan to operate salt resources business. Now, the company has introduced the absolutely leading factory equipment, production technology and quality management to manage the high-end salt brand *Anthela*. On 4-5 November 2017, One Belt and One Road Yantai Forum-the First China-Pakistan Cooperation Forum held in Shandong Yantai. In this forum, Yantai salt resources Company, Laiyang Salt Field, Yantai Zhengze Import and Export Corporation and Shenzhen Cangnan Baisheng Investment Co. Ltd signed a contract with Pakistan side for importing the Pakistani Rose Salt, this project will invest about one billion RMB.<sup>[19]</sup>

The scale of production capacity cooperation between China and Pakistan in the field of salt resources is still small, and the two sides still have the potential to further expand production capacity cooperation. China and Pakistan should actively encourage Chinese salt and chemical enterprises to seek investment cooperation opportunities in the field of salt and chemical industry in Pakistan, and to establish and extend the industrial chain of salt and chemical industry in Pakistan. By pushing China-Pakistan production capacity cooperation to a deeper level in the field of salt and chemical industry, we can increase the proportion of Pakistan's secondary industry in GDP and enhance the endogenous driving force of Pakistan's economic development.

## V. Conclusion

The security situation and tourism environment in Pakistan are gradually improving, foreign tourists travel to Pakistan began to increase. Integrating the Khewra Salt Mines and surrounding tourism culture resources, gradually forming a unique tourism brand of salt for health and wellness tourism. This will be conducive to the preservation and utilization of the cultural heritage of the salt resources in Pakistan, to strengthen the attractiveness of Pakistan's tourism industry.

In the context of the deepening of the China-Pakistan Economic Corridor and the sustained and stable development of Pakistan's economy, the development of Pakistan's secondary industry will be accelerated, and the demand for industrial products will also be further enhanced for Pakistan's sustained economic development. Pakistan has the advantage of raw materials with rich salt reserves. Pakistan can strive to expand the salt chemical industry and extend the salt chemical industry chain by accepting industrial transfer from other countries and strengthening production capacity cooperation between China and Pakistan. The above measures should be taken to meet Pakistan's domestic demand for salt chemical products, promote the cultivation of relevant industrial and technical personnel, reduce imports of related products and reduce consumption of foreign exchange reserves.

In a word, Pakistan should make full use of the advantages of rich salt resources, and Pakistan actively cultivate salt chemical industry and the health and wellness tourism with the characteristics of rock salt. The full development of the salt resources will reduce Pakistan's import of salt-related chemical products to reduce its consumption of foreign exchange. At the same time, Pakistan's foreign exchange reserves will be increased through measures such as expanding the export of salt resources and attracting more foreign tourists to Pakistan for salt themed health and wellness tourism. The sound development of the salt resources in Pakistan will be conducive to the sustained and stable economic development of Pakistan and will also provide necessary support for the smooth progress of the China-Pakistan Economic Corridor.

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